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IN TWO SECTIONS

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EDITORIAL DEPARTMENT NOTE

The first article in this issue of the *Bulletin* is a typical case study of the type that N.A.C.A. members have become accustomed to. A problem is presented, the methods adopted in solving the problem are outlined and the results achieved are described. This particular presentation is especially interesting because the company involved is not only small but has been in existence for only a short time, and the industry is one of our newest and most rapidly growing ones—the plastic molding industry. Readers will be interested in the accounting procedure developed and particularly in the utilization of this accounting technique in the elimination of certain unprofitable lines and the placing of other unprofitable lines on a profitable basis.

The author of this article is Robert W. Peden, Cost Accountant of the Bundy Tubing Co. A Canadian by birth, Mr. Peden has lived most of his life in the United States and has a B.S. degree from Hiram College and an M.S. degree from Columbia University. He has been associated with the Bundy Tubing Co. for the past three years, prior to which he served for several years as Controller and Treasurer of the Mueller Brass Co., Port Huron, Mich. Mr. Peden has contributed several other papers to the N.A.C.A. *Bulletin* and has spoken frequently before N.A.C.A. chapters and at the National Convention. He is serving during the current year as Vice President of our Detroit Chapter.

Our second paper deals with a somewhat controversial phase of standard cost procedure. While we feel that most industrial accountants will concur with Mr. Wood in the method he has indicated for the treatment of variances, we realize that there will be some who disagree and suggest the Open Forum section of the *Bulletin* for those who care to express their dissent.

Clifford G. Wood, the author of this second article, is a native of Oak Park, Illinois. Educated in the Department of Electrical Engineering at the University of Illinois, Mr. Wood switched to the field of accounting in 1926, when he joined the Rockford office of Lybrand, Ross Bros. & Montgomery as a Junior Accountant. He has continued with this firm to the present time and is now a Supervising Senior Accountant with the Rockford office. Mr. Wood is a member of our Rockford Chapter.

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NATIONAL ASSOCIATION OF
COST ACCOUNTANTS

JANUARY 1, 1939

COST ACCOUNTING IN THE PLASTIC MOLDING INDUSTRY—A CASE STUDY

By Robert W. Peden, Cost Accountant,
Bundy Tubing Co., Detroit, Mich.

THIS paper was prepared for the following specific reasons:

1. To illustrate the benefits of a cost program for a small, rather than a larger corporation.
2. To outline the procedure which may be followed in setting up rates and standards in a new company with practically no historical background.
3. To explain the adaptation of proven techniques to a new and rapidly growing industry, namely the plastic molding industry.
4. To indicate the value of a cost accounting program as a diagnostic or fact-finding agency whereby favorable and unfavorable trends both in manufacturing processes and in sales policies may be identified, measured and controlled.

The business described is that of the Detroit-Macoid Corporation of Detroit, a closely owned company with two main types of service: (1) the coloring of metal parts such as automobile hardware, and (2) the manufacture and assembly of plastic molded parts such as the buttons, levers and knobs used for automobiles, radios, building construction and furniture. The company has had a rapid and flourishing development and is in the third year of its existence. All figures used in this treatise are illustrative only and are submitted by the courtesy of the management. The development of the procedure described herein is the result of a series of round-table discussions on Saturday mornings with Mr. H. G. Hendrie, Vice President and General Manager; Mr. J. E. Gould, Treasurer; Mrs. Gertrude Colt, Chief Accountant, and the present writer.

Departmentalizing the Plant

When it was decided that a more nearly complete system of cost control was desirable the following departments or expense groupings were adopted:

(a) Direct manufacturing departments to be used as cost centers:

Dept. 10 Polishing
" 11 Mixing
" 12 Dipping
" 13 Granodizing
" 14 Spraying
" 15 Finishing
" 16 Plastic Molding.

(b) Indirect manufacturing departments, the expenses of which were to be apportioned to the direct departments:

Dept. 20 Solvent Recovery
" 21 General Factory.

(c) Selling and administrative departments, the expenses of which were to be absorbed by means of a separate loading against the manufactured costs:

Dept. 25 Sales
" 26 Shipping
" 27 Administrative
" 28 Research and Experimental.

After this grouping had been agreed upon a standardized form of monthly expense statement, illustrated by Exhibit 1, at the end of this article, and a complete chart of accounts were adopted. It was arranged that all debits to the *actual* manufacturing expense control account and that all credits for *standard* manufacturing burden applied to the cost records should be credited to a companion control account, so that the net difference between the two control accounts should always reflect the actual over-absorbed or under-absorbed manufacturing burden.

At the beginning, the area of the plant was subdivided according to these departments and a schedule of standard monthly journal entries was computed for the purpose of apportioning all depreciation, state, county, and school taxes and insurance costs to the various centers in accordance with the invested cost values in each. Wherever possible, all repairs, supplies, indirect labor, foremen's salaries and similar indirect costs were charged to the

departments directly. Heat, light, power, gas and water were charged to the departments benefited in accordance with flexible schedules based on such factors as floor space, killowatt hours, meter records and other data. As the solvent recovery department was intended to have a salvaging function, it was arranged to credit or debit the gain or loss due to its operation back to the mixing department in order that the cost rate of the latter department should reflect such resulting economies, if any.

The total of the general factory expenses was apportioned to the direct burden-bearing cost centers on the basis of the current twelve month "moving total" of the direct labor and burden incurred in each. Inasmuch as a large percentage of the manufacturing expense was chargeable directly to the cost centers it was agreed that any attempt to split the apportioned charges into fixed and variable elements was not justified by the size of the company.

Establishing the Bases for Costing

Concurrently with this process of departmentalization similar decisions were made for the purpose of establishing the proper basis for costing the product. The following schedule will illustrate the outcome of this analysis:

Department	*Type of Wage Payment*	*Bases for Costing the Burden*
Polishing	Piece Work	Percentage of Direct Labor Cost
Mixing	Day Work	Standard Rate per Pound Mixed
Dipping	Piece Work	Percentage of Direct Labor Cost
Granodizing	Day Work	Standard Cost per Hundred Pieces
Spraying	Day Work	Percentage of Direct Labor Cost
Finishing	Day Work	Percentage of Direct Labor Cost
Plastic Molding	Day Work	Standard Machine Hour Rate

In the polishing, dipping, spraying and finishing departments, where the labor was more important than the equipment as a cost factor, it was decided to charge such labor directly to the detailed cost sheets and to absorb the burden by means of rates based on the direct labor cost. In the mixing department a serially numbered form known as a "Batch Card" was adopted as a summary of the ingredients of each mix and as a record of the total pounds mixed daily and monthly. It was obvious, therefore, that in this department, it would be accurate and economical to consider all the labor as part of the operating burden and to absorb it into

the costs by means of a flat or standard rate per pound resulting from the relationship between the total mixing burden and the total pounds mixed. Similarly, in the granodizing room all operating labor was included in the burden accounts and a cost rate per hundred pieces processed was devised. In the plastic molding department, where the machines were of a uniform size and type and wage rates were uniform among the machines, the operating labor costs were included with the burden and absorbed by means of a single machine-hour rate, the variations in cost being reflected as factors of the time required for production.

Classifying the Sales

Because the company was manufacturing and processing a heterogeneous list of products and because the owners were anxious to know not only the cost of each product but also the results of each class of business, it was decided to set up on the general ledger separate and distinct sales, cost of sales, and sales return accounts for each of the following types of product:

Automobile hardware
Automobile wheels
Parts for building construction
Radio parts
Bulk solutions
Plastics
Charges for plastic molds
Miscellaneous sales.

The accounting procedure stipulated that all sales were to be credited to the particular sales accounts affected and all monthly costs of such sales were to be debited to the corresponding cost of sales accounts. Thus provision was made for detailed profit and loss statements, showing profits or losses under eight classifications.

Calculating the Burden Rates

After the foregoing steps had been taken a period of five months was allowed to elapse before computing standard burden rates or standard costs. At the end of that time a study was made of the volume of production for that period and a comparison was made with the volume for the corresponding months of the first year. Three of the months represented summer produc-

tion of low volume, and two of the months represented winter production of high volume. Accordingly, a calculation was made on the assumption that a normal year's business would consist of seven high months and five low months. The burden rates for the various departments were then calculated in the following manner:

Months of Low Production	*Actual Burden*	*Actual Machine Hours*	*Actual Cost Per Hour*
August	$5,210.98	1,310	$3.98
Sept.	3,160.42	1,140	2.77
Oct.	4,810.96	1,317	3.65
TOTAL	$13,182.36	3,767	$3.50
AVERAGE	4,394.12	1,255.6	3.50
Months of High Production			
Nov.	$8,210.95	5,233	$1.57
Dec.	7,922.40	5,014	1.58
TOTAL	$16,133.35	10,247	$1.574
AVERAGE	8,066.67	5,123.5	1.574
1. 7 x high averages	56,466.69	35,864.5	1.574
2. 5 x low averages	21,970.60	6,278	3.50
3. Annual Total	78,437.29	42,142.5	1.8612
4. Standard rate adopted			1.85 per hr.

Although such a policy obviously meant the absorption of a certain amount of idle expense as an operating cost, the officials of the company felt justified in making the decision. They believed that the cost and price structure should be so arranged that an ample profit could be made in the months of high production and an "even break" or better obtained during the low period of each year. With standard burden rates calculated in this manner, it was possible to undertake the next step in the development of the program, viz., the determination of actual and standard costs in detail.

Computing the Costs of Coloring

Exhibit 2 illustrates the procedure developed for determining the cost of coloring. The example is for a casting which is first polished, then dipped, and finally assembled and inspected on a conveyor. The figures under the caption of material costs indicate the quantity of color materials used at the weighted average

cost per pound shown on the batch or mixture cards. A loading is then made at a standard cost per pound to cover the cost of mixing. The total cost resulting represents the delivered and mixed cost of all solvents and pigments used in dipping the part specified.

The exact direct labor in the polishing, dipping and finishing departments is then added, and the burden of these centers is computed at the standard rates. All such total costs are then divided by the net production to obtain a net manufacturing cost per hundred pieces actually finished. It is to be noted that all material, labor and burden costs for spoiled work are absorbed. The sales and administration cost is added by computing a percentage on the total manufacturing cost, including materials.

Computing the Cost of Plastics

Exhibit 3 outlines the means by which the cost of plastics is obtained. As the compounds are drawn from storage they are charged to the jobs at the inventory prices per pound for all ingredients. All sprue and all scrapped parts are segregated by weight and credited at the cost per pound figures which the company has adopted for such materials. The exact hours consumed on the molding machines are then extended at the standard cost rate for that operation. The actual finishing labor and the burden at a standard percentage are then added to round out total manufacturing costs.

A difficult problem in connection with plastic costs is that of accounting for the costs of the molds or dies: Two principal practices prevail in the industry. In some cases the customer can be persuaded to purchase his mold at a definite price and then to pay a flat or constant piece price for his plastic parts. This is the most convenient and satisfactory method for the manufacturer. When the customer is reluctant to do this, however, it is necessary to quote a variable price dependent upon the quantities purchased. Exhibit 4 represents the compilation of a cost estimate for this express purpose. It indicates how the amortization of the mold over various quantities contemplated results in a set of prices which enables the customer to select his quantity and the manufacturer to be protected against a loss due to excessive mold costs per hundred pieces purchased.

The details of handling the mold costs are interesting. An account entitled "Unamortized Molds" is included among the deferred assets. It is charged with the full cost of each mold as it is purchased. In addition a card record, similar to a permanent asset record, is set up for each mold. As nearly every mold pertains to the current model year of automobile construction, and as it is desired to absorb each mold cost during the model year, it is the practice to write off to expense one-twelfth of the cost of each mold every month. This amount is charged to a special cost of sales account entitled "Cost of Sales Variance Account for Molds." Concurrently each month this variance account is credited and the monthly plastic work-in-process cost record is charged with the exact amount of mold amortization absorbed according to the quantities made and shipped at the price differential allowance. The balance in the variance account is treated as a debit or credit to the plastic profit and loss statement.

This arrangement accomplishes two functions. In the first place, it assures the company that all mold costs are absorbed entirely during each model year. In the second place, it provides for the inclusion on each cost sheet of the exact amount of mold amortization earned according to the differential in the piece price. To make this clear, it should be stated that in the automobile trade a high price is charged for a plastic until an established production figure is reached, when a lower price prevails, the difference being considered as a "differential for mold amortization." Thus the variance account described above acts as an equalization factor.

As a further check on each plastic job an annual cost record card, Exhibit 5, was designed for the accumulation of the monthly and year-to-date costs as they are completed throughout the year. This card is charged each month with one-twelfth of the mold cost *regardless of the quantity sold,* the result being a somewhat varying unit cost but at the same time an accurate historical record of the total and final outlay for each part—material, labor, burden and mold costs.

Compiling the Standard Costs

The next step in the development of the program was the calculation of a standard cost for each part. This was a relatively

simple process and involved only an analysis of the material, labor and scrap factors in the light of current prices. The standard costs adopted were in no sense "average costs" but rather a representation of what each part would cost to produce on the basis of the most up-to-date prices and an attainable performance in the use of labor and equipment.

When such costs were computed they were used for the determination of a standard cost-of-sales journal entry. Under each sales classification two cost-of-sales accounts were set up, one for the cost of sales of the particular class at the standard cost, and the other a cost of sales variance account. Each month the shipments of materials are extended at the standard costs, charged to the standard cost of sales account, and credited to the corresponding variance account. The actual costs as compiled from the monthly cost sheets are then credited to work in process and charged to the variance accounts. The debit and credit variances then represent gains or losses in manufacturing costs as measured by the standards. These accounts are an index of the success or failure of the manufacturing executives in their program of cost control.

A second function performed by these standard costs is illustrated by Exhibit 6, which is the profit and loss statement by a sales classification. The gross margin between the standard cost of sales and the net sales is an accurate measure of the gross profitableness of each line when transitory volume and other factors are excluded.

Compiling the Profit and Loss Statement by Classes

In approaching the task of preparing a profit and loss statement by classes of product the officers of the company were guided by the simple mathematical axiom that the whole must be equal to the sum of all its parts. They believed that it was not sufficient to obtain a single monthly figure representing a final profit or loss. They wanted to know how much each class of sales had contributed to such composite result; whether an unprofitable line showed symptoms of improvement; whether the difficulty was due to manufacturing or to sales policies; and above all, whether they should abandon a class of product and spend their efforts upon the

development of proven lines, or, by a concerted effort of the organization, endeavor to change it from the red to the black.

As the actual and the standard manufacturing costs were made assignable to their proper sales classes as heretofore outlined, the problem presented was obviously one of the correct allocation of certain other expense elements to the different sales divisions. Chief among these were the burden balances and the totals of the sales and administration expenses.

The problem of apportioning the burden balances was solved as follows: the debit or credit balance in each manufacturing burden center was prorated only to those classes of sales which utilized that process in their manufacture. For example, the balance in the polishing department was apportioned to those colored parts which had been polished. The balance in the dip-room center was apportioned to those products which had been dipped. The finishing department balance was prorated to those classes which had passed through that department. The balance in the plastic molding center was naturally assigned only to the plastic sales division. All such prorating was done on the basis of the standard manufacturing labor and burden costs for each sales classification.

The allocation of the sales and administrative expenses was somewhat similar. Although a standard rate was used for the absorption of these sales and administrative items on each cost sheet, no attempt was made on the profit and loss statement to differentiate between such standard and actual "commercial" burden. Instead, it was assumed that the gross margin between the net sales and the standard manufacturing cost was a sufficient guide to the potential profitableness of each sales group. On the profit and loss statement an analysis was first made of those sales and administrative items which were directly assignable to sales groups. Examples of such items were shipping containers charged directly to the shipping department burden, certain delivery expenses, and certain field inspection services charged to the sales group. After these assignments were made the remainder of the sales, shipping, administrative and experimental burden was allocated to the several sales lines on the basis of the standard manufacturing cost of each, including material, labor

and burden. As an analysis of the relative importance of the material, labor and burden control of each sales division did not indicate any essential differences in their apportionment, this technique was considered sufficiently accurate.

The net outcome of all these calculations was the production of nine monthly profit and loss statements, one for the total result and one for each of the eight classes of sales. According to expectations, some of these final figures were profits and some were losses.

Results

Since it was intimated at the beginning that one of the functions of cost accounting was that of making a diagnosis of processes and products, it may be of interest to enumerate several of the practical benefits which have resulted either directly or indirectly from these methods.

Almost as soon as the first departmental burden statements had been compiled it became evident that one of the processes in the plant was costing the company an excessive amount to operate. As soon as this was noted a closer check was made of all the labor, maintenance, power and other factors involved, and a calculation was made to determine whether other methods could be substituted. When later burden statements confirmed the original figures it became conclusive that the process should be discontinued. Accordingly the power was shut off, all operating labor was transferred to other productive work, and the equipment was allowed to remain idle. Still later, in order to save floor space, the equipment was dismantled and written off the books. The result was a substantial saving in net manufacturing costs.

The experience of the company in connection with this equipment bears witness to the fact that one of the functions of a cost system is not merely to establish correct prices but to measure and compare manufacturing methods. Operation costs should be so revealed that antiquated methods can be known promptly. Above all else, when new machines and processes are installed, calculations should be made in advance to determine how quickly the accumulated economies will pay for the additional investment.

A second benefit accrued from the divisional profit and loss statements. As soon as these had been prepared for several

months, the figures showed that three of the lines were definitely "in the red." An analysis of one line indicated clearly that the extent of the loss was such that at the prevailing prices it undoubtedly could not be put on a profitable basis. Since the company was definitely committed for schedules covering a model year's requirements, a decision was made to finish the year's production but to insist on substantially higher prices for the next year's requirements. When the customer refused to meet these advanced prices the decision resulted in the elimination of a complete class of business.

The two remaining classes of sales were studied intensively. Certain manufacturing operators were changed, others were eliminated, and machine processes were used to replace hand methods. In the short space of a few months these lines had been placed on a permanently profitable basis without adjustment of the prices.

In brief, at the end of the second year of its existence and at the end of the first year of this type of detailed cost control the net earnings had improved to the extent of 110.3 per cent of the first year's figures, whereas the net sales had increased only 19.65 per cent. Logic forbids making the inference that a set of records was the only cause of the improvement. But when reliable records are placed in the hands of an energetic and resourceful management and when they are immediately and thoroughly applied to the substantial benefit of stockholders' interests, we are perhaps justified in concluding that the procedure truly represents what James H. Bliss has characterized as "management through accounts."

DETROIT MACOID CORPORATION
BURDEN STATEMENT
FEBRUARY—1937

INDIRECT LABOR	*February*	*January*	*Year To-Date*
1601—Foreman	$ 7.50	$ 10.95	$ 187.25
1602—Operating Labor	312.54	235.80	2,180.70
1605—Press Set-Up	13.40	.....	72.89
1606—Salvage Plastic Material...	18.50	13.25	193.48
	$351.94	$260.00	$2,634.32
REPAIRS			
1620—Die Repairs	.....	$ 42.35	$ 42.35
1621—Plastic Repairs	$ 38.92	.....	315.19
1622—Machines	.....	.....	286.14
1629—Miscellaneous	29.86	33.50	372.96
	$ 68.78	$ 75.85	$1,016.64
SUPPLIES			
1644—Electricity	$187.32	$203.84	$1,586.72
1646—Water	17.50	18.25	152.15
1647—Oil	.....	.....	164.00
1648—Glycerine	.....	2.10	21.60
1649—Heat	16.80	13.85	112.40
1650—Miscellaneous	23.50	13.10	132.85
	$245.12	$251.14	$2,169.72
TOTAL CONTROLLABLE BURDEN	665.84	586.99	5,820.68
FIXED CHARGES			
1661—Rent	$ 19.50	$ 19.50	$ 128.00
1662—Depreciation	165.00	165.00	1,985.00
1663—Taxes	8.62	8.62	68.28
1664—Insurance	7.86	7.86	58.94
	$200.98	$200.98	$2,240.22
APPORTIONED CHARGES			
1681—General Factory	$146.21	$206.28	$2,371.97
GRAND TOTAL PLASTIC BURDEN	1,013.03	994.25	10,432.87
Credit for Standard Burden @ 4.00 Per Hour	1,112.00	864.00	11,165.82
Burden Balance .....Cr.	98.97	130.25	Cr. 732.95
Total Rate	3.64	4.60	3.87
Chargeable Hours Per Month....	278	216	2,696

Figures purely illustrative

EXHIBIT 1

DETROIT MACOID CORP. - COST RECORD SHEET

Customer STEWART WARNER Part Auto Handle Part No. 5741-9-C Month MARCH 1939

Color BLACK	Current Month			Fiscal Year To Date		
	Quantity Lbs	Unit Cost	Total Cost	Quantity	Unit Cost	Total Cost
1-Material Cost						
Inventory Of 2/28	2455	.12	294.60			
Mtrl Requisitioned	5297	.12	635.64			
TOTAL	7752	.12	930.24			
Inventory Of 3/31	6432	.12	771.84			
Net Consumption	1320	.12	158.40			
Cost of Mixing		.05/lb	66.00			
Mtrl for Recondition	1000#	.04	40.00			
TOTAL MTRL COST	2320	.2328	540.40			
MTRL COST PER C			.2045			

Production	Quantity	Percent		Quantity	Percent	
Gross	182714	100.0 %				
Scrap	13320	12.9 %				
Rework						
NET	129414	87.1 %				

2-Oper.Cost	Pieces Produced	Labor Cost	Burden Cost	Total Cost	Cost Per C	Pieces Produced	Labor Cost	Burden Cost	Total Cost	Cost Per C
ORDERS 60% Polish	58375	712.18	427.09	1139.44	1.952					
Granodize										
110% Dip	59490	215.20	236.72	451.92	.760					
Spray										
Mold										
75% Finish	57698	485.18	326.39	761.43	.81					
TOTAL OPER.		1362.46	990.34	2352.79	3.525					

3-Summary Per C	Month	Cost Per C		Year	
Material Cost	1330	.2045			
Operation "	2352.79	3.525			
Die "					
Mfg. "	2535.71	3.53			
S. A. & E. " @ 3%	76.07	1.06			
TOTAL "	3296.53	4.59			

EXHIBIT 2

DETROIT MACOID CORP.

MONTHLY PLASTIC COST RECORD

CUSTOMER STEWART WARNER PART ASH TRAY HOUSE PART NO. 124-10C MONTH MARCH 1938

DESCRIPTION	CURRENT MONTH			YEAR TO DATE		
	QUANTITY	COST PER POUND	TOTAL COST	QUANTITY	COST PER POUND	TOTAL COST
MATERIAL COST:						
MTRL. DELIVERED	505 #	.70	353.50			
CREDIT FOR SPRUE	1.1	.05	.54.55			
	324	.779	252.65			
CREDIT FOR SCRAP	61	.05	3.05			
	263	.779	204.66			
CREDIT FOR BURN	13	.00	.00			
NET MTRL. USED	250 #	.807	201.66			
PRODUCTION						
GROSS	23666	100.0 %				
SCRAP	2641	11.2 %				
BURN	87	.3 %				
NET	20938	88.5 %				
NOZZLE SCRAP 12# - CARRIED -						
OPERATION COST	HOURS	RATES	COST	HOURS	RATE	COST
MOLDING LABOR	30	4.00/HR	120.00			
FINISHING LABOR			120.00			
FINISHING BURDEN		50 %	60.00			
TOTAL OPER. COST			240.00			
SUMMARY:-		TOTAL COST	COST PER C PCS			
MATERIAL		201.66	1.01			
OPERATION		240.00	1.206			
INSERTS		50.00	.25			
TOTAL		491.66	2.465			
DIE COST		121.10	.607			
TOTAL MFG.		792.80	3.762			
S & A 30 % MTRL & OPER ONLY		167.88	.80			
SELLING COST		957.68	4.562			
PROFIT OR LOSS		410.96	2.06			

EXHIBIT 3

DETROIT MACOID CORPORATION

COST ESTIMATE SHEET FOR PLASTICS

CUSTOMER Hudson Motor Car Co
ADDRESS Detroit
DATE April 20-1938
NAME OF PART Knobs. PART NO. S. 4930

DESCRIPTION			QUANTITY	UNIT COST	TOTAL COST	COST PER C PCS.
MATERIAL COST						
MATERIAL DELIVERED			79.00	70	55.30	
CREDITS: SPRUE	15.5 %		12.25	45	5.51	
SCRAP	.3 %		.25	45	.11	
BURN	11.4 %		9.00	0	0	
TOTAL CREDITS			21.5	26	5.62	
NET MATERIAL COST			57.5	.864	4968	.998
PRODUCTION						
GROSS	100.0 %		5006			
SCRAP	.5 %		27			
BURN	%		0			
TOTAL SCRAP	.5 %		27			
NET PROD. PIECES	99.5 %		4979			
			HOURS	RATE	TOTAL COST	COST PER C Pcs.
LABOR & BURDEN COST						
MOLDING LABOR			17	4.00	68.00	1.366
FINISHING LABOR					70.00	1.406
FINISHING BURDEN	75 %				52.50	1.054
TOTAL OPERATING COST					190.50	3.826
SUMMARY:-						
MATERIAL COST					4968	.998
OPERATION COST					190.50	3.826
COST OF INSERTS					10.01	.20
TOTAL COST WITHOUT MOLDS					250.19	5.025
SALES & ADM. @	30 %				72.05	1.447
MOLD COST @ 10,000 PCS						5.000
" " @ 50,000 PCS						1.000
" " @ 100,000 PCS						.500
TOTAL COST @ 10,000 PCS						11.47V
" " @ 50,000 PCS						7.47V
" " @ 100,000 PCS						6.97V

STATISTICS:-
NUMBER IN MOLD 2
MACH. PROD. PER HR. 290
WGT. OF 1 PIECE 5 Grams
WGT. OF C PIECES 500 "
MATERIAL NO. AW/1702 MS
ESTIMATOR
1-2 mold cost $500.00

PRICES QUOTED	COST	PROFIT	PRICE
WITHOUT DIES	$6.47V	.64V	7.11V
WITH DIES @ 10 M	11.47V	1.29+	12.76
" " @ 50 M	7.47V	.93	8.40V
" " @ 100 M	6.97V	.69	7.66

REMARKS Pieces out extra as in time of C pieces

EXHIBIT 4

PLASTIC COST RECORD

CUSTOMER Stewart Warner — PART NO. 124-10C

NAME OF PART Ash Tray Knob — NO. IN DIE 4 — DIE NO. 2695AM — UNIT WT. .752 Grams

Week	Gross Wt. Mtrl.	Wt. Sprue	Wt. Scrap	Wt. Runner	Net Wt.	% Scrap	Net Pieces	Total Mtrl. Cost	Unit Mtrl. Cost Lbs.	Unit Mtrl. Cost ¢ per Lb.	Molding Cost Hrs.	Molding Cost Total	Molding Cost ¢ per Hr.	Finishing Cost Total	Finishing Cost ¢ per Hr.	Die Cost Total	Die Cost ¢ per Hr.	Die Repairs Total	Die Repairs ¢ per Hr.	Summary Total	Summary ¢ per Lb.
Jan	500	115	20.5	14.5	350	30	18764	289 02	.826	154	30	120 00	.64	257 02	1.37	177 90	.948	27 00	.144	870 94	4.642
Feb	720	130	16.5	8.5	565	22	29997	438 08	.775	1.76	40	160 00	.643	207 08	.833	177 50	.715			983 06	3.95
Year	1220	245	37	23	915	25	48661	727 10	.795	1.665	70	280 00	.64	464 10	1.065	355 40	.815	27 00	.062	1854 00	4.25
Mar	505	121	21	13	350	31	20998	289 60	.827	1.38	30	120 00	.571	150 00	.714	177 90	.847	31 50	.15	769 00	3.662
Year	1725	366	58	36	1265	27	69659	1016 70	.804	1.572	100	400 00	.619	614 10	.95	533 30	.825	58 50	.09	2623 00	4.057

EXHIBIT 5

DETROIT MACOID CORPORATION
COMPARATIVE PROFIT & LOSS STATEMENT FOR HARDWARE

JANUARY—1937

	January	*Percent*	*Year To-Date*	*Percent*
1. Gross Billings, Incl. Castings	$28,570.42	171.83	$127,345.60	174.74
2. Less: Castings & Parts...	11,354.02	68.29	51,784.30	71.06
3. Gross Billings	17,216.40	103.54	75,561.30	103.68
4. Returns & Allowances	589.34	3.54	2,684.22	3.68
5. NET SALES INCOME	16,627.06	100.00	72,877.08	100.00
MANUFACTURING COST OF SALES				
6. Cost of Sales at Standard.	12,518.37	75.29	48,652.89	66.76
7. Variances from Std. Costs D	329.22	1.98	2,672.72	3.76
8. Over- or Under-Absorbed Burden	123.15	.73	46.22	.06
9. Inventory Shrinkage	215.34	1.30	461.22	.63
10. Total Manufacturing Cost.	12,527.64	75.34	51,833.05	71.12
11. Actual Mfg. Profit or Loss	4,099.42	24.66	21,044.03	28.88
12. Sales, Adm. & Exper. Burden	1,894.39	11.38	9,695.33	13.31
13. Normal Operating Profit..	2,205.03	13.26	11,348.70	15.57

Figures purely illustrative

EXHIBIT 6

DISPOSITION OF VARIANCES FROM STANDARD

By Clifford G. Wood, Staff,
Lybrand, Ross Bros. & Montgomery, Rockford, Ill.

THE question which I am going to discuss, dealing as it does with variances from standard, presupposes a knowledge of the character and derivation of such variances and the procedure giving rise to them. Many who do not employ standard costs may not be entirely familiar with the principles involved. I shall therefore devote a few moments to a very brief outline of some of the basic principles.

Standard Costs and Variances

Standard costs have been defined by many writers on the subject, one definition being that they are "predetermined costs computed on the specifications of the product." Cost figures derived by accumulating actual material costs, actual direct labor costs, and an item of "normal" or "average" burden are often considered "standard costs." Such a system might be described as a "part-standard" cost system. A "full-standard" system implies the use of predetermined standards for all elements entering into the product—standards for material and for labor as well as for manufacturing burden. In this connection it should be noted that in establishing standards for material, for example, the elements of quantity and price would both have to be determined. Likewise, labor wage-rates as well as hours would be involved in the establishment of labor standards.

In the limited space available, I cannot attempt an explanation of the various bases upon which standards may be developed. Regardless, however, of what methods are used, certain differences between actual costs and standard costs will be encountered in practice. These differences are termed "variances." In a full-standard cost system the following variance accounts could be set up on the records:

As to Material:
Usage variance
Price variance

As to Labor:
Efficiency variance
Wage-rate variance

As to Manufacturing Burden:
Efficiency variance
Activity variance
Expense variance

Variances Explained

The variances with respect to material and labor are more or less self-explanatory. Burden variances may require some explanation for the benefit of those unaccustomed to their use. "Burden efficiency variance" measures the difference between the product of actual hours at the standard rate and the product of standard hours at the standard rate. "Burden activity variance" measures the difference between the budgeted burden at a certain percentage of plant capacity and the product of the actual hours times the standard rate. "Burden expense variance" measures the difference between actual burden and the budgeted burden at a certain percentage of plant capacity.

Not all concerns employing standard cost procedure use the seven variance accounts outlined above. Some use only three accounts, one each for the aggregate variation of the elements of material, labor and burden. Moreover, individual preferences or prejudices are evidenced by the treatement of standard costs on the records. In most cases, perhaps, the cost system is completely tied in with the general accounting records, but it is not unusual to find instances where so-called standard cost records are maintained apart from the general accounting records. These are utilized as a form of statistical record by means of which comparisons are made between actual results and hypothetical standard cost procedure.

I may, perhaps, have devoted more time than was necessary to outlining the foregoing principles. However, a discussion of the treatment of variances from standard would be somewhat meaningless to anyone not having at least a rudimentary conception of their nature. For the remainder of my discussion I am going to assume that we are dealing with an instance in which the cost system is tied in with the general records. For the most

part, it will be immaterial whether extended variance analysis is in effect or whether only three variance accounts are employed.

Further Definition of Terms

Our question is: "Should variances from standard be absorbed in the period in which they occur or should they be absorbed in the period in which the product is sold?" This question contains several terms which should be defined before proceeding with the discussion. My opening statements were intended to define the terms "variance" and "standard," so far as such terms can be defined in a few words. With reference to "absorbing" variances, I have construed the word "absorbed" in this connection to mean taken through the profit and loss account. The term "period" may be considered as either a full accounting period of twelve months or an interim period of a month, or a quarter, or six months. For the purposes of my discussion, I have construed "period" to mean a complete accounting period of twelve months. In this connection, let me say that if, hereafter, I use the word "year" instead of "period" I am referring to a "natural business year," comprising twelve calendar months but not necessarily ending on December 31. We are discussing certain phases of operation under a full-standard cost system, and any organization sufficiently progressive in its management to adopt standard cost accounting should not hesitate to adopt a natural business year.

Two Viewpoints on Nature of Standard Costs

The question under discussion is not new, nor is it one, I believe, upon which an overwhelming majority opinion can be obtained. Accountants, generally, appear to be divided into two groups over the question and their views are almost diametrically opposed. One group holds that costs can only be "actual" costs, and that, therefore, standards, no matter how useful from a statistical standpoint, should not be reflected on the general records. This group, however, will modify their beliefs to the extent of permitting the elimination from costs of variances due to idle plant capacity, but they feel that all other forms of variances are merely fictitious debits and credits which should be ignored in the

general records. Another major group of accountants holds that standard costs are "true costs" and that any excess over standard costs is a waste, and, therefore, a proper profit and loss charge. Their contention is not so much that this excess over standard is not a *cost,* but that it is a *cost of waste or inefficiency* and should not be confused with *cost of goods or product.*

It should be obvious that the variance accounts at the end of any particular period may have either debit or credit balances. Moreover, not all of the variance accounts need have the same type of balance. Credit balances in variance accounts are less frequently encountered than debit balances, and it might be well, therefore, to dispose of this phase of the subject first before going on to a discussion of the treatment of the more common debit balances.

Disposition of Credit Variances

Credit balances in variance accounts may arise from improperly set standards or because the plant has worked an extra number of hours, or at a greater average percentage of capacity than normal, or perhaps through some unanticipated savings in expenses. If the standards were improperly set, or if the change in the percentage of plant capacity utilized is to continue, there can be no question but that the standard costs should be revised to reflect these new conditions, and the inventories and costs of goods sold restated upon the basis of the new standards. The necessary adjustments resulting from such a restatement would, of course, be charged to the variance accounts. These adjustments might completely eliminate the credit balances or there might remain a credit balance in some of the variance accounts. If we assume that the standards have been properly set, and that there still remains a credit balance in one or more of the variance accounts, these credit balances should be split into two parts. One part would represent the amount of the variance applicable to the product already sold, while the second part would represent the amount applicable to goods on hand. The scope of my topic does not permit any discussion of the methods by which such a segregation of the variance balances may be effected. We shall have to assume that the division has been made.

The portion of the credit balance applicable to goods already sold is, of course, a realized profit and may be taken into the profit and loss account. The portion of the credit balances applicable to goods on hand represents, however, an *unrealized profit* in the manufacture of the product. As such it has no place in the income account of the current period. The most conservative treatment of this item would be to apply it as an adjustment to inventory valuation, although some arguments are advanced for its treatment as a deferred credit to income. If applied to reduce inventories, such application may take the form of an adjustment of specific items or of a valuation reserve applied to reduce the total inventory. Generally speaking, the reserve method is preferable since, if the standards were properly set, as we have assumed, the unit values of the items in the inventory should not be disturbed.

Disposition of Debit Variance

We now come to the treatment of debit balances in the variance accounts. Here again I think it is safe to assume that we are speaking of an instance in which proper standard costs have been established. As a matter of fact, if the standards have not been properly established, they should be adjusted and the necessary adjustments carried through the variance accounts. In most cases debit balances would still remain. We will consider that we are working with debit balances under the assumption of properly set standards.

Debit balances in variance accounts are, generally speaking, due to waste, inefficiency or idle plant capacity. Arising from such causes, they are expenses. I may be challenged on this point by those who contend that these variances are costs. I will not dispute the use of the word "cost" instead of "expense," but I contend that they are *costs of waste and inefficiency* and not of the product. As costs of waste, they can have no relation to inventory value. They are a loss of the period in which they occur and should be borne in that period. As a matter of fact, the effect upon the profit and loss account over a long cycle will be the same. If the inventories at standard cost at the end of a certain period should be $1,000 and the variance accounts had aggre-

gate debit balances of $100, it will readily be seen that the total profit and loss charge for this $100 item will be the same over a two-year period, whether written off in the current period or whether it finds its way through the cost of goods sold in the subsequent period. There is, moreover, no objection to deferring debit variances from month to month during the accounting year in order to equalize the monthly statements in a seasonal business. This procedure is quite frequently followed and has considerable merit. Because of the limited time available this evening, this phase of the subject cannot be covered and I have restricted my discussion to the treatment of variances existing at the end of a full accounting period.

Nature of Variances Distinguished

I made a general statement to the effect that debit balances are usually the result of waste, inefficiency or idle plant capacity. Of the seven variance accounts which I mentioned in my opening statements, four of such seven contain items properly classified as waste, inefficiency or idle plant capacity. These variance accounts are material usage variance, labor efficiency variance, and burden efficiency and activity variances. Any debit balances in these accounts may properly be construed as the result of inefficiency, waste or idle plant capacity. It is difficult to see how any support could be brought to the contention that such items could increase the inventory valuation. They are expenses and should be borne in the period in which they occur. Argument can be advanced for a difference in the treatment of material price variance, labor wage-rate variance and burden expense variances, and these items are included by some accountants in the inventory on the theory that inventories must be at cost where cost does not exceed market values. This appears to be fallacious reasoning, for if a concern is operating under a full-standard cost procedure, and if the standards are properly set, they are "true costs." As a practical matter, if the standards are well set, the debit balances of the last three variance accounts will be reduced to a minimum, and conservative accounting would dictate that they also be written off to profit and loss.

Alternative Treatment Not Approved

Up to this point I have expressed the opinion that debit variances should be absorbed into profit and loss in the period in which they occur while credit balances should be taken into profit and loss or deferred as a reduction of inventory value, depending upon whether the product to which the credit variance applied was sold or unsold at the end of the period. It might be well to mention a different treatment which is sometimes given these variances and to point out the possible errors into which one may be led. The alternative treatment involves the use of surplus reserves and may be briefly described as follows:

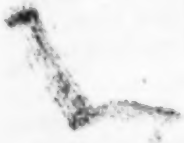
Credit variances applicable to product sold within the period are sometimes set up as direct credits to a reserve account instead of being passed through the income account; in other cases the reserve is set up out of surplus after the credit variances have gone through the income account and been closed to surplus. The expressed purpose of the reserve is to absorb charges for debit variances in subsequent periods in order to mitigate the effect on the income account of sharp fluctuations from standard costs. It will readily be seen that, if the reserve is established *from surplus* after having previously credited income with credit variances, the income account is materially distorted between periods since it receives the benefit of credit variances but no charge for debit variances. This distortion is avoided if credit variances are passed directly to the reserve account without being included as income. This latter procedure is followed by some organizations, but, generally speaking, it is preferable to carry both the credit and debit variances through the income account. If a surplus reserve is deemed advisable, it may be established out of surplus but care should be taken that it is not used to relieve the income account of charges which should properly be included therein.

Suggested Treatment Accords with Fundamental Accounting Principle.

Most of the controversy with regard to the question under discussion arises between cost accountants and general or public accountants in the preparation of financial statements. I do not see that statements prepared for financial or credit purposes need

differ in principle from those prepared for internal use. It has long been an axiom among accountants, particularly public accountants, that financial statements should provide for all losses but reflect no unrealized gains. I have set forth the opinion this evening that credit variance balances applicable to goods on hand should be applied as a reduction of inventory valuation, while debit balances should be absorbed as an expense in the period in which they occur. Where this procedure is adopted, it seems that the axiom of providing for all losses but anticipating no gain has been well met, and that no conflict need arise between general and cost accountants.

In conclusion, I should like to emphasize that the statements and opinions I have expressed represent only my own views on the question involved and should not be construed as representations of the firm with which I am connected.



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